AARDO International Workshop (2003)
Agricultural Technology Transfer and Its Consequences
105-121

Technology Transfer through Information Dissemination: FFTC in the Sustainable Agriculture Partnership[1]

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ABSTRACT

The Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region was established in response to severe periodic shortages of both food and fertilizer in the 1970s. It was apparent at that time that a lack of technical information among farmers was the basis of the problem, compounded by an inadequate fertilizer supply and a shortage of improved seeds. To alleviate these problems, the FFTC has been steadfastly fulfilling its mission of providing farmers with practical information about new technologies. It has not usually contacted farmers directly, but has supplied technical information to teachers, extension staff, and others who act as disseminators of information. The Center is the only organization of its type operating within the Asian-Pacific region. For the past few years, all those working for and with the Center have tried to collect and disseminate useful information on agricultural technology and policy, for the benefit of farmers of the region. The impressive body of work of this small organization provides testament to the widespread support and cooperation it has received over the years. With 33 years of service in this age of information, the Center carries on its mandate. There is an abundance of scientific information available in publications and on websites. However, its value still lies in meeting the information needs of the user. By promoting exchanges of information, the FFTC helps ensure that extension specialists and scientists in the region are aware of useful technology being developed in neighboring countries. Discussions at the Center's international meetings and through international networks set up by the Center maintain an on-going dialogue between those who provide technical information and those who make use of it. The Center will continue to provide information that will help farmers increase their incomes. In its future programs, the Center will continue to focus its efforts toward sustainable productivity and the sustainable management of resources. This report describes some of the Center's major activities,

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1 Resource paper presented in the "International Workshop on Agricultural Technology Transfer and Its Consequences" held from 25-30 August 2003, Agricultural Research Institute, Wufeng, Taichung, Taiwan

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achievements, future aspects and the role it has played in the dissemination of information for the development of sustainable agriculture in the region.

Introduction to the Mission of the FFTC

An important source of technical information

The Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region has an unusual role among the world's international agricultural centers. It collects and disseminates research results generated mainly by agricultural centers in the Asian-Pacific Region. The aim is to provide farmers with improved information about new technology, so that they can achieve higher yields and incomes.

The world has evolved a highly effective research system for developing new agricultural technology. It has been less successful in making use of this research. Large amounts of research data are being generated every year. However, a great deal of it is not being put to any practical use. The success of practical agricultural research should be seen, not in the prizes or promotions it brings to scientists, but in the benefits it brings to farmers and consumers.

The Center was established in 1970 to act as a clearinghouse for research carried out in the region, and to help bring the results to farmers. It is always difficult to quantify the impact of information on farm production. However, it is certain that the Center's work over the years has provided a great many scientists and extension specialists in the region with important technical information to meet farmers' needs. Moreover, it was an important source – sometimes the only source – of technical information from other countries in the region.

A clearinghouse for regional research

The Center also acts as an intermediary between international and national agricultural institutes in the Asian-Pacific region. In this way, the Center makes research from each country available to its neighbors. This provides a greater scope for collaborative work, and helps avoid duplication of effort. The Center's information services have always had a regional focus, and all its programs involve groups of Asian-Pacific countries.

As it developed its information programs, the Center has been concerned with technology suited to the small-scale farms of the Asian-Pacific region. Technology of this kind requires a rather small capital investment, compared to the capital-intensive farming of Western countries. It makes intensive use of small land holdings, and it has a relatively low risk.

The technology disseminated by the FFTC covers a wide range, from the protected cultivation of high-value crops to low-cost and practical technology which uses on-farm resources, such as crop by-products for livestock feed. It also covers post-harvest handling and marketing, and other aspects of agricultural economics.

Background of the FFTC

Programs on food production

The period when the Center was established in 1970 was at a time of food scarcity. There was a regional shortage of both rice and fertilizers, and many people feared that there were worse shortages to come. The Center was established to help raise farm incomes and agricultural yields of the Asian-Pacific region by improved technology, especially fertilizers and improved varieties. Hence the Center's name: The Food and Fertilizer Technology Center for the Asian and Pacific Region.

Information for small-scale farmers

Some problems in the region are common to farmers all over the world. Others are specific to the region. Asia must feed 60% of the world's population from less than one-third of its land. The average size of land holdings is small, often less than one hectare (2.6 acres). During the past 40 years, the technology of the Green Revolution has transformed Asia's agriculture. Country after country has moved from a shortage of staple foods into a surplus. Average crop yields have risen to levels never seen before. In recent years, the focus has been on sustainable agriculture, and on helping Asian farmers survive in an era of trade liberalization.

Over the years, the programs held by the Center have adapted to meet the changing needs of the region's farmers. However, the focus of all its work has remained the same: small-scale farms of the Asian-Pacific region.

Organization and Funding

The Center's professional staff is composed of specialists from various agricultural disciplines. They are recruited internationally from countries in the Asian-Pacific region. The administrative staff is employed locally. Both are under the supervision of the Director, who is appointed by the Executive Board.

The Center is advised about its policies and programs by the Technical Advisory Committee (TAC), made up of distinguished agricultural scientists in the region. Most of them have worked with farmers and have been involved in agricultural development programs.

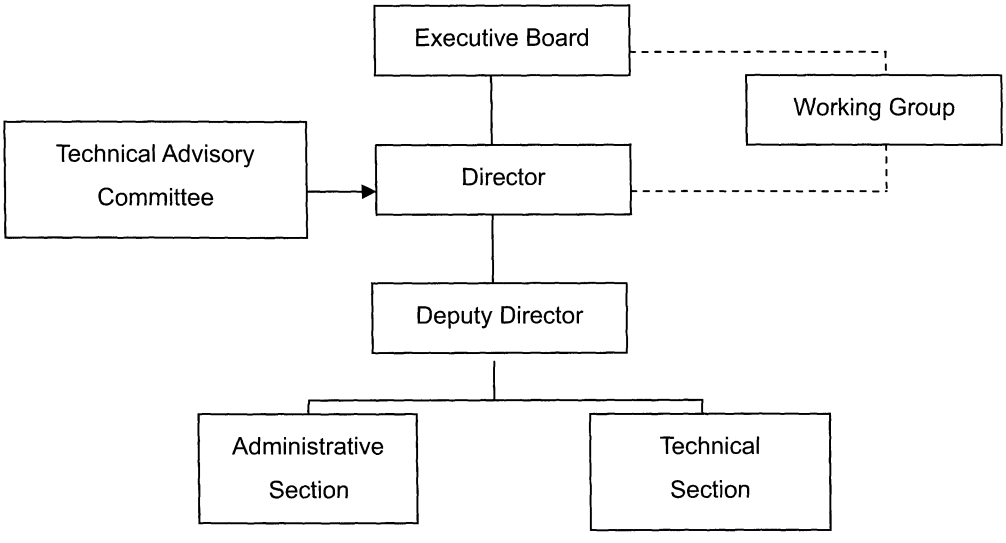
The TAC meets once every 2 years in a member country in turn, to identify information needs, evaluate the effectiveness of the Center's work, and make recommendations on how the Center might improve its future work programs.

The Center works in close cooperation with national and international agricultural centers in the region. All its programs for collecting and disseminating information are carried out with the help of co-sponsors, who support these programs with funding, personnel, or both. The Center also consults other agricultural centers in developing all its annual work programs. The Center makes every effort to ensure that its information programs address major regional problems and meet actual regional needs. The operation and management activities of the Center are voluntarily funded by five member countries which are represented on the Center's Executive Board and Working Group.

Other countries, including Malaysia, Thailand, and Indonesia, provide funds and other support on a project-by-project basis. All the Center's programs are international, and are carried out in countries of the Asian-Pacific region in cooperation with other agricultural centers and institutes.

The Center is based in Taipei, Taiwan, ROC. The policies of the Center are decided by the Executive Board, made up of senior officials from the member countries. The Board also establishes operational procedures and approves the Center's annual work programs and budget.

The Executive Board is assisted by the Working Group, also made up of representatives from the member countries who help Board members with technical advice and support. Both the Executive Board and the Working Group meet twice a year in Taipei. The organization structure of the Center is illustrated as follows:



FFTC Information Programs

The Center's information work is broad-based, reflecting the information needs of small-scale farmers in the region. Asian farmers generally grow a mixture of several crops, and many of them keep livestock as well. Their income is determined by total farm production, not by the performance of any single crop. To make it useful, the Center's information work covers the full range of farm activities such as crop and livestock production, plant protection, soil and fertilizer management, and post-harvest activities, etc. In collecting and disseminating information, the Center is concerned with practical technology which can be applied on farms.

The Center does not disseminate information directly to farmers. There are too many of them, and many different languages are used in the region. Instead, the Center disseminates technical information to people working for national extension systems, and other people who work with farmers and act as "multipliers of information". Information collected by the Center can also be transferred to farmers by means of "training the trainers" so that those trainers can then channel information into the hands of needy farmers.

The Center makes every effort to maintain high standards of relevance in its information programs. It repeatedly reviews the information it disseminates, evaluates its program activities, and consolidates its work by conducting follow-up projects.

The first decade: Increased food production

The early programs of the Center focused on increasing food production to meet a regional shortage of staple foods. At that time, the technology of chemical fertilizers and high-yield varieties was just coming into use in most countries in the region. Fertilizer management was an important topic of the Center's early programs, especially for rice. Information was also collected and disseminated on improved crop varieties and chemical pest control.

Agricultural cooperatives were important in helping Asian farmers make the change from subsistence to commercial farming. Early programs of the Center included the management of cooperatives as a source of farm inputs and farm credit. Other programs were concerned with the economics of fertilizer use, and post-harvest handling and marketing.

In tropical and subtropical Asia, farmers can often grow three or more crops each year in the same field. Multiple cropping programs were important during the Center's early years. Livestock was also emphasized, both for draft use and for sale. Early programs emphasized integrated crop/livestock/fish farming.

Use of on-farm resources

The earnings of small-scale farmers are limited by the size of their farms, and so is the scale of their investment. Many useful technologies may be too expensive for such farmers. Labor-saving methods using inputs produced on the farm itself are often those which are most suitable for small farms.

The information collected and disseminated by the FFTC has always included low-cost, low-risk technology. This includes using crop by-products as raw materials for composting or for livestock feed.

An important topic has been the biological control of pests and diseases. Sometimes this involves the mass release of natural enemies. Other approaches include new cropping systems which create a habitat which is unfavorable to pests and diseases.

For livestock, the emphasis has been on hardy local breeds, rather than imported high-performance animals which need good management if they are to survive. The Center has also collected and disseminated technology developed by farmers themselves, using local resources.

The second decade: Diversification for higher incomes

By the beginning of the 1980s, costs of farm inputs were rising rapidly. The Center began a new series of programs on improved uses of alternative resources. These included nutrient recycling, the use of green manures, and biological nitrogen fixation.

At that time, many countries in the region were rapidly developing. Economic success produced higher incomes. There was a growing interest in diversification as a way of improving farm incomes and meeting the needs of urban consumers. The Center's programs focused on the production of a greater range of crops, especially high-value crops such as fruits and vegetables. There were also many programs on livestock production and management.

Fruit and vegetable crops have special marketing problems compared to field crops. They are bulky to transport, and highly perishable. Seasonal gluts and shortages lead to wide price fluctuations.

Some of the Center's programs at that time focused on post-harvest handling and marketing of horticultural crops. Others were concerned with the use of low-cost plastic structures. These allow farmers to harvest crops out of season, when prices are higher.

Sloping agricultural land technology (SALT)

SALT technology is a simple and low-cost method of farming in slopeland areas without loss of topsoil. Hedgerows of leguminous trees and grasses are planted along the contour

lines. Crops are grown in the spaces between the hedgerows. Sometimes goats or other small livestock are kept, and are fed on crop residues and fodder cut from the hedgerows. Since the animals are penned, their manure can be collected and used as fertilizer. Livestock offers a high profit per unit of labor invested. They are easier to market than most crops.

The third decade: Sustainable agriculture

In the 1990s, we all began to be aware of the environmental aspects of agriculture and to take into account the long-term costs of intensive agriculture based on short-term returns. Every country in the region was experiencing a decline in the quality of many agricultural soils, waterways, and forests. Accordingly, the information programs of the Center began focusing on sustainable agriculture, which maintains soil fertility and conserves the resource base for future generations.

Efficient fertilizer use is a vital part of sustainable agriculture. Many programs were held on soil testing, plant analysis, and crop nutrient management. Slopelands all over the region are deteriorating under intensive agriculture. Sustainable cropping systems for slopelands often combine food crops with agro-forestry or livestock. Production technology includes low-cost conservation methods such as contour planting.

Sustainable agriculture does not necessarily mean organic agriculture. The Center's programs for Asia emphasize combined use of organic and chemical inputs. Organic cropping is difficult in the tropics. Nutrients are quickly leached from tropical soils, and pests are numerous.

Programs for the new millennium

The overall policy of the new millennium is to promote sustainable development. The Center's programs aim to improve productivity, foster the sustainable use of soil and water resources, enhance the rational use of fertilizers, and promote systems of integrated pest management which make minimal use of chemicals.

Sustainable management of soil and water resources will be a central theme. This must be a basic part of Asia's future agriculture. Where current agricultural methods lead to soil loss and reduced fertility, new technologies need to be extended. Monitoring is important, so that each country can detect environmental problems at an early stage, when they can more easily be remedied.

Agriculture is not sustainable unless it is profitable. The Center's programs will focus on improving farm incomes, including new sources such as agricultural tourism. Increases in income, rather than increases in yield, are the ultimate goal. FFTC programs will also collect and disseminate information on how to reduce production and marketing costs, in order to make Asian farmers more competitive.

FFTC Activities Regarding Information Collection and Dissemination

A. Collection of Information

The Center collects technical information from research institutes and extension centers throughout the Asian-Pacific region. One important source of information is a regional network of national extension systems. Cooperating organizations in the network send in information, and evaluate the information collected by the FFTC. The Center also holds seminars and workshops to discuss urgent regional problems, and publishes the information from these. The scientific staff also carries out surveys to collect information with the help of local cooperating organizations.

Information is disseminated in several ways. The Center disseminates information in its publications, which are sent free of charge to selected agricultural libraries in the region. They are also made available on its website and database.

The Center also holds follow-up projects such as training courses to disseminate useful new technology. It has organized a number of long-term demonstration projects in member countries, some of which have gone on to become national programs.

The FFTC develops its work programs in close consultation with other agricultural centers in the region. At least one of these, and usually several of them, act as co-sponsors of each program. The co-sponsors help with the organizing work, and provide staff, funding, and various facilities. Most importantly, they provide ideas, and help the FFTC to identify the important problems of the region's farmers.

From 1970 to December of 2002, the Center carried out various forms of international cooperative ventures such as sponsoring 38 training courses and 162 international workshops and seminars. More than 12,000 people working in agriculture have attended these meetings, not counting many thousands of observers. The participants included government officials, research scientists, and extension staff. They came from 37 countries, most of them in the Asian-Pacific region.

Activity flow

In identifying problem areas and defining the most feasible way to tackle a specific problem, the Center regularly adopts the following sequence of activities:

*Surveys to obtain benchmark information;

*Seminars and workshops to develop feasible solutions; and

*Publications and training courses to disseminate the technical know-how or management skills to those who will use them to benefit farmers.

1. Surveys

The staff of the Center carries out various types of surveys so that they can make an in-depth assessment of a particular problem. Surveys are often concurrently carried out in several countries of the region. This gives the survey team a comparative idea of how serious a problem is, and ways in which it affects different countries in the region.

1) Survey of fertilizer

In keeping with the Center's focus on fertilizer, the first survey carried out by the FFTC, in 1973, was of the regional fertilizer situation. This was repeated 10 years later to monitor changes. A more-recent survey looked at chemical pesticides and herbicides in the region, including distribution channels, patterns of usage, and health and environmental issues.

2) Survey of applied biotechnology

Biotechnology is sometimes seen as high-level technology for industrialized countries. However, it can make great contributions to Asian smallholders if scientists and research institutes in Asia were to focus on farmers' needs. The FFTC has carried out a survey on applied biotechnology in livestock production for which we collected information on the use of biotechnology in making cheap, effective vaccines for livestock, improving the nutritional value of various feedstuffs, and increasing the reproductive rate.

3) Survey of post-harvest and extension systems

FFTC surveys have collected information on many other topics, including post-harvest losses of fruit and vegetables, and their causes. The results have served as a basis for workshops and training courses concerned with marketing and post-harvest handling. An important topic of surveys has been the region's national extension systems, in order to define information flows and determine more about the information needs of farmers.

4) Survey of plant virus diseases

A major survey project spanning more than 12 years has been concerned with virus diseases of crops. This work has been supported by a special grant from one of the member countries.

The survey was carried out in 12 Asian-Pacific countries by interdisciplinary teams. They previously believed that virus diseases were particularly destructive to perennial crops which are propagated vegetatively (Seeds generally break the cycle of virus transmission).

Virus diseases of crops are difficult to diagnose on the basis of visible symptoms, as these vary from one plant to another, and sometimes resemble the symptoms of nutrient disorders. Once a plant is infected, it cannot be cured. Infected plants must be destroyed, and replaced with disease-free seedlings.

Even replanting may not solve the virus problem. The FFTC found that many young seedlings in plant nurseries were already infected. They had been grown from cuttings taken from parent stock which was infected with the virus but did not yet show symptoms. The information from such long-term survey projects was the basis of a series of FFTC programs which disseminated new methods of diagnosing plant viruses, and which helped establish disease-free nursery systems for seedlings.

2. Seminars and workshops

Seminars and workshops are a major source of technical information. Each year, the Center holds three to five seminars and workshops in different Asian countries. At these international meetings, experts discuss problems identified by the surveys and try to find solutions. Seminars focus on research results and policy issues. Workshops are more concerned with the practical extension and application of new technology.

National and international agencies based in the country where the meetings are held act as co-sponsors, and provide the venue and other support services. Over the years, the Center has built up strong links with other agricultural centers in the region.

It consults with these other centers regularly to ensure that the topics of the Center's seminars and workshops do not overlap with those of other centers, and that they fill important information gaps.

3. Regional network

In the year of 2000, the Center carried out a survey to clarify information flows in national extension systems in the region. The FFTC survey team visited eight countries to discuss with extension staff how and from where to collect information on new technologies in each country, and how and where to disseminate them to other countries.

As a result of the survey, FFTC was able to establish a network for the collection and dissemination of technical information. Initially, it covered eight countries: Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan, Thailand, and Vietnam.

Cooperating agencies in each country in the network contribute information which is published by the FFTC in leaflet form. The network of coordinators also selects and translates

suitable technologies from the leaflets for extension use in their own countries.

Another important function of the network is assessment. The coordinators review leaflets during and after preparation. The FFTC follows their recommendations to ensure that the leaflets are topical and useful.

The FFTC hopes to extend the network in the future to cover more Asian-Pacific countries, and to monitor the information needs of the region's small-scale farmers.

B. Dissemination of information

1. Training courses

The Center holds training courses to show participants some useful new techniques or management skills. Some training courses are for scientists, such as courses on new methods of indexing plant viruses, or testing fruit and vegetables for pesticide residues.

Other training courses are for farming leaders and extension workers. Several of these have been concerned with livestock. One popular training course was on the production of mule ducks (a sterile interspecific hybrid which is an excellent meat duck). Another was on the use of biotechnology for breeding cattle and water buffalo. Other courses have been concerned with crop production, particularly multiple cropping, crop-livestock integration, and sustainable farming systems for slopelands.

Training courses are always international in terms of both the tutors and trainees. Often the same training course is held in different countries in turn, so that the maximum number of people can attend. Training courses always cover practical techniques, and include hands-on training as well as lectures. Trainees are from Asian-Pacific countries. The techniques they are taught are intended to bring immediate benefit to the farmers they work with.

The FFTC has held a number of training courses on the diagnosis and indexing of plant virus diseases. After conducting the training, it provided the molecular diagnostic probes to national laboratories in Indonesia, Japan, Korea, Malaysia, Philippines, and Thailand. It has also held training courses on the propagation of disease-free planting materials. The aim is to help countries in the region develop national systems to provide small-scale farmers with disease-free planting materials.

2. Distribution of publications

In spite of new information technology, the printed page is still the most important way of communicating technical information between countries. Publication is a major work program of the Center. It includes technical and extension bulletins, a book series, newsletters, and a regular publication which gives statistical information about important agricultural indices in the region.

In 2001, the FFTC began publishing two new types of leaflets. The "Practical Technology" series consists of extension leaflets for small-scale farmers in the Asian-Pacific region. Most of the leaflets are based on technology provided by an international network of cooperating agencies. The same network helps to translate the leaflets and disseminate the information to farmers.

The series "Research Highlights" summarizes important agricultural research which has recently taken place in the Asian-Pacific region. This series is intended for scientists in the region, to help them keep up with new developments in neighboring countries.

Since its inception, the Center has distributed more than two million publications free of charge to libraries and agricultural workers in 80 countries. Most of the publications are sent to countries in the Asian-Pacific region. They are also made available free of charge on the Center's website and database.

The Center's publications disseminate applied agricultural research, rather than basic research. There is an emphasis on practical technology for small farms in Asia, rather than basic research.

The Center's publications over the past three decades constitute a huge database of practical technology for small farms in the region. This technology covers the full range of on-farm activities in both tropical and temperate Asian countries. By May 2002, the Center had distributed:

* 664 free agricultural Bulletins (509 Extension Bulletins and 155 Technical Bulletins, a total of more than two million copies); and
* 59 books, all distributed free of charge to more than 1000 libraries in the region.

3. Access to our website and database

Access to computers and the Internet is growing rapidly in the region. Most universities, research institutes, and national extension headquarters are now using information technology.

The FFTC is making increasing use of the Internet as a cost-effective way of disseminating information. The Center has established an on-line database. It has a search function, so that users can quickly find the specific information they need. It can be accessed via the Center's website at http://www.fftc.agnet.org

The website also has details of FFTC activities and programs.

The database gives all users free access to the full text of its books, bulletins, and leaflets published since 1990. The publications are available as text-only HTML files with linked images, or as PDF files.

The database is being continually expanded and updated, and is now available on CD-ROMs. Materials in the database include the extension leaflets and manuals published by the FFTC.

The database is intended primarily as an information resource for national extension systems of the Asian-Pacific region. The information it contains, including the extension leaflets, can be downloaded, translated, or adapted in other ways to meet the information needs of local farmers.

4. Field demonstrations

A practical field demonstration of a new technology can sometimes give more information to farmers than any number of written words. The Center has carried out a series of field demonstration projects, in cooperation with national agricultural centers in the country concerned. For example, the first demonstration, in 1971, was held in the Philippines and was concerned with multiple cropping. Over the next 5 years this program was expanded to ten sites, and went on to become a national program. Later, two long-term field demonstrations were organized in Thailand. One was on pasture production under coconut palms, to give farmers extra income from raising livestock on fodder from coconut plantations. The other was located near the northern city of Chiang Mai, a major vegetable production area. It showed farmers low-cost improved methods of vegetable production, using mulches and drip irrigation. These were followed by a field demonstration program carried out in several sites in the Philippines. It demonstrated the production of corn and other crops in lowland paddy fields during the off-season.

A recent field demonstration project is a citrus orchard in Vietnam, which shows how to manage a disease-free orchard. The first step is disease-free seedlings, using the technology disseminated by the FFTC. The problem then is how to keep the trees free of viruses.

The demonstration orchard uses a range of modern techniques. They are proving very effective. They include monitoring the population dynamics of the vectors and aphids which spread the diseases. Pesticide sprays are properly applied when numbers of the vectors increase. The young trees are regularly tested for viruses and greening. There are also periodic inspections of inoculum sources of the greening pathogen, citrus viruses, citrus canker, etc.

Although these methods may seem rather complex, they are successfully followed by farmers in Taiwan. They seem to be the only way to keep orchards healthy in tropical Asia. Each tree receives standard treatment in terms of fertilizer, watering, drainage, pruning, and harvest.

The Future Outlook: Information Needs of Asian Farmers

Sustainable agriculture for small farms

Since the Center was established in 1970, the technology of improved varieties and chemical fertilizers, which the Center has helped promote throughout the region, has proven very successful. By the end of the 1980s, one Asian country after another had become self-sufficient in rice. For a while, it seemed as if food shortages would soon be a thing of the past. Nowadays, the outlook is bleaker. Yield increases may be reaching an upper limit. Since the mid-1980s, food production per capita has been declining.

The ratio between population and food in the region seems to be getting worse rather than better. In low-income countries, the production of staple foods and the funds available to pay for imports are no longer keeping up with population growth. The area of arable land is shrinking, as urban and industrial zones continue to expand.

The Center's future programs will collect and disseminate information that will help farmers in the region maintain and expand their gains of the past. Asian farmers will need information on cropping patterns and agricultural practices which provide resilience in the face of unpredictable weather changes.

Another important topic will be the multifunctionality of agriculture. We are becoming aware that as well as food and other commodities, agriculture provides many additional benefits.

For example, the benefits of irrigated rice farming are particularly high. They include flood prevention and conservation of groundwater. Some studies have found that the value of such benefits is even greater than that of the harvested rice. If agriculture is providing these benefits to society, perhaps we should find ways for society to reward farmers for providing them.

Sustainable uses of agricultural resources

All over the world, agricultural productivity is under threat or in decline, especially in the tropics. If Asian agriculture is to continue to feed Asia's huge populations, the agricultural resource base must be conserved. The most important components are the soil, water, and genetic resources of both plants and animals.

Sustainable agriculture is based on the efficient management of agricultural resources. This will allow the resource base to remain productive indefinitely, so that it can support Asia's future generations.

The Center will continue to collect and disseminate information on sustainable agriculture. By this, we mean agriculture which not only protects the environment, but is profitable and acceptable to farmers.

1. Soils

Soils are the basic resource of agricultural systems. Regardless of the crop, production systems must protect the soil from erosion and contamination, and maintain its fertility. The Center's programs will promote sustainable soil management for both lowland and slopeland areas, to maintain and improve soil fertility.

2. Fertilizers

Fertilizer programs will emphasize the efficient use of fertilizers, both organic and inorganic. Efficient fertilizer use means a good match between fertilizer applications and the nutrient needs of the crop. Plants do not suffer from a deficiency of any nutrient, but no excess nutrients are applied. To achieve this, farmers need to know the nutrient status of both the soil and crop. Soil testing and plant analysis will be emphasized, including testing systems suitable for small-scale farms. Other important topics will be recycling of plant nutrients and composting.

3. Water

Water resources are already a limiting factor for the region's agriculture. The situation is likely to become worse. In every Asian nation, industrialization and cities are taking more and more of the available water supply. Global warming and climatic change may make rainfall less predictable, which will render it difficult for farmers to plan their crops. FFTC information programs will include water-saving strategies for both irrigated and rain-fed cropping systems.

Overall, the Center will continue to promote the production and improvement of food crops and livestock by small-scale farmers, in a way which addresses the totality of production, post-production, and marketing systems.

Sustainability in agricultural development is not an alternative, but a necessity. If sustainable land use is not achieved, long-term trends will still continue and major changes will occur, but they will be negative and destructive ones.

4. Livestock resources

Livestock will continue to be an important topic in the Center's information programs. The Center's programs will collect and disseminate information on feeding and management practices which are suited to small farm production. They will cover improved feeds and nutrition, breeding, and animal health.

Livestock health problems will be a major concern, including emerging infectious diseases. Other programs will be concerned with technology to improve reproductive performance, and to increase the value of livestock products.

Asian farmers in an era of free trade

1. No alternative to agriculture

The Uruguay round of GATT ushered in a new era of global free trade, under the WTO. For many years, most Asian countries have been protecting their farmers with production subsidies, import tariffs, and price supports. Some, such as Thailand and Malaysia, are major world exporters of agricultural products, but most Asian countries have large numbers of farmers on small farms. Even before the WTO, farmers had marketing problems. Now, their problems have become critical.

Under the WTO, production subsidies and price supports will have to be reduced or removed altogether. Just as they have lost these supports, Asian farmers are having to compete with cheap imported produce in their own domestic markets. At the same time, farmers are under pressure to consider the long-term impacts of their farm practices and to protect the environment.

The region's farmers will need to be well informed if they are to prosper under a free-trade system, while conserving natural resources. Traditionally, Asian agriculture has been based on small farms run mainly by family labor. In the production of staple crops, such farms are at a disadvantage when competing with large, well-capitalized land holdings in countries overseas.

2. Improved management and new sources of income

Unless small-scale farms in the region develop new forms of production or find new sources of income, they may not survive. Widespread failure of farms in the countryside will add enormously to the problems of Asia's crowded cities, and add huge numbers of people to what are already overcrowded labor markets.

The Center's information work will aim at increasing the sustainability of small farms in the region. The two keys to future viability are improved management (including an increase in the scale of farm operations) and new sources of farm income. The Center will collect and disseminate information on new and promising ways in which farmers can earn extra income.

These will include agricultural tourism in generating farm income from home-stays, food processing, and other rural industries, new specialty crops, and organically grown foods. There will be an emphasis on production for niche markets, and on quality rather than quantity in agricultural production.

3. Agricultural cooperatives

Agricultural cooperatives have been very helpful in helping small-scale farmers achieve economies of scale in both production and marketing. In many countries, they have also eased the transition into modern commercial agriculture by providing farmers with farm inputs and credit.

4. Other forms of organization

Asian agriculture of the future is likely to see the development of other forms of organization which link industry and agriculture, and crop and livestock production. Wherever these benefit small-scale farmers, the Center will collect and disseminate information about them.

Global free trade will tend to primarily benefit farmers with good access to information and low production costs. There is not much that small-scale Asian farmers can do to increase the size of their land holdings – the dense populations of Asia and the high price of land will always be a limitation. However, there is a great deal they can do to reduce their production costs and increase the value of their produce. Relevant and timely technical information may make all the difference in whether the region's farmers are able to use their land effectively and productively, growing high-quality crops for which there is good market demand.

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